REMARKS

Applicants note with appreciation the Examiner's indication that claims 9-13, 15-19, 21, 29, 38-41, and 43-44 have been allowed and that claims 4, 24, and 27 contain allowable subject matter but were objected to as being dependent from a rejected base claim. Rather than re-write claims 4, 24, and 27 in independent form, applicants have elected to argue for the patentability of the respective rejected base claims.

In the Office Action, the Examiner rejected claim 42 under 35 USC §102(e) as anticipated by Thakur et al (commonly-assigned). Applicants note that the rejection more correctly should be based 35 USC §102(a) and will argue as if the rejection had been made on that basis. Thakur relates to a capacitor structure that includes a high dielectric constant dielectric layer. Specifically, in the embodiment of Thakur relied upon by the Examiner, Thakur teaches the use of polysilicon, crystalline silicon, or hemispherical grain polysilicon, germanium, or silicon-germanium to form bottom plate electrode 104 (col. 7, lines 66-67, col. 8, lines 1-2). The electrode 104 is then subjected to a "relatively high pressure surface treatment" that may comprise either rapid thermal nitridation or oxidation (col. 8, lines 18-31). Thakur teaches that when high dielectric constant (HDC) dielectric materials are to be used in the capacitor structure, "RTN is typically used instead of oxidation."[1]

The high-pressure surface treatment creates a diffusion barrier layer 122 between the bottom electrode 104 and the HDC dielectric 102 (col. 8, lines 58-60). Thakur teaches that the presence of such a diffusion barrier is "needed" and "essential" (col. 8, line 66, col. 9, line 22). After another high-pressure surface treatment to densify the HDC layer (col. 10, lines 22-26), a top plate electrode 106 is deposited (col. 10, lines 60-63).

Claim 42 recites, *inter alia*, "oxidizing an upper surface of said non-oxide electrode" and "depositing a high dielectric constant oxide dielectric material directly onto the oxidized surface of said non-oxide electrode." While the Examiner has asserted

[1] The Examiner further notes in the Office Action that in embodiments of Thakur that use a metal for the l wer electrode, Thakur "teaches away from oxidizing the lower electrode." (Paper No. 15, page 6)

that Thakur teaches an oxidation step (col. 8, lines 20-24), what Thakur actually states is that rapid thermal nitridation (RTN) is to be used when the dielectric material to be deposited is a HDC material. Thus, Thakur does not teach oxidation where dielectric layer 102 is a high dielectric constant material, but rather **nitridation**. Additionally, because of the materials used by Thakur for the bottom plate electrode 104, Thakur must form ("needed" "essential") a diffusion barrier layer **between** bottom electrode 104 and dielectric layer 102.

Thus, Thakur fails to teach or suggest the invention claimed in claim 42 because Thakur teaches nitridation, not oxidation, of the non-oxide electrode, and Thakur teaches forming a diffusion barrier layer between the bottom electrode and dielectric layer, not depositing the dielectric material directly onto an oxidized surface of the non-oxide electrode material. Because Thakur fails to teach each and every limitation of the claimed invention, applicants submit that Thakur does not anticipate claim 42.

Also in the Office Action, the Examiner rejected claims 1-3, 5, 6, 8, 22, 23, 25, 26, and 28 under 35 USC §103 as unpatentable over Thakur. Independent claim 1 recites "oxidizing an upper surface of said non-oxide electrode using an O_3 gas plasma" and "depositing a high dielectric constant oxide dielectric material directly onto the oxidized surface of said non-oxide electrode." As discussed above with respect to claim 42, the embodiment of Thakur relied upon by the Examiner teaches using **nitridation** not oxidation, and further teaches forming a diffusion barrier layer between the non-oxide electrode and high dielectric constant dielectric material.

Further, the Examiner concedes that Thakur does not teach the use of an O_3 gas plasma, but simply asserts that such would have been obvious. However, Thakur does not use gas plasma at all. Accordingly, the Examiner's assertions about the obviousness of selecting gas plasma appear to be based on attempted hindsight reconstruction of the claimed invention. The Examiner is reminded that 37 CFR §1.104(d) requires the citation of a prior art reference in support of such a rejection (or alternatively, an affidavit by the Examiner). In the absence of any prior art that would teach or suggest the claimed invention, applicants submit that claim 1, and claims 2-3, 5-6 and 8 that depend therefrom, are patentable v r Thakur.

With respect to independent claim 22, applicants again point out that, in the embodiment relied upon by the Examiner, Thakur teaches nitridation, not oxidation, of the non-oxide electrode, and Thakur teaches forming a diffusion barrier layer between the bottom electrode and dielectric layer, not depositing the dielectric material directly onto an oxidized surface of the non-oxide electrode material. Further, the Examiner concedes that Thakur does not teach performing the surface oxidization of the electrode and the deposition of the high dielectric constant material in the same deposition chamber. While the Examiner asserts such to be obvious, he again does not cite to any prior art reference teaching (37 CFR §1.104(d)). For all of these reasons, applicants submit that claim 22 is patentable over Thakur.

With respect to claims 23, 25, 26, and 28, applicants again point out that, in the embodiment relied upon by the Examiner, Thakur teaches nitridation, not oxidation, of the non-oxide electrode, and Thakur teaches forming a diffusion barrier layer between the bottom electrode and dielectric layer, not depositing the dielectric material directly onto an oxidized surface of the non-oxide electrode material. Further, with respect to independent claim 25, and claims 26 and 28 that depend therefrom, the Examiner concedes that Thakur does not teach or suggest the use of gas plasma to oxidize the surface of the lower electrode.

As discussed above, Thakur does not use gas plasma at all. Accordingly, the Examiner's assertions about the obviousness of selecting gas plasma appear to be based on attempted hindsight reconstruction of the claimed invention. 37 CFR §1.104(d) requires the citation of a prior art reference in support of such a rejection (or alternatively, an affidavit by the Examiner). In the absence of any prior art that would teach or suggest the claimed invention, applicants submit that claims 23, 25, 26, and 28 are patentable over Thakur.

For all of the reasons stated above, applicants submit that claims 1-3, 5, 6, 8, 22, 23, 25, 26, 28, and 42 are patentable over Thakur and that all of the claims presently pending in this application are in condition for allowance.

Respectfully submitted,

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